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(54) **PROCESS AND ARRANGEMENT FOR RETRIEVING OF EQUIPMENT FROM BORE HOLES**
VERFAHREN UND VORRICHTUNG ZUM ZURÜCKHOLEN VON AUSRÜSTUNG AUS EINEM
BOHRLOCH
PROCEDE ET DISPOSITIF POUR RECUPERER DU MATERIEL DANS DES TROUS DE FORAGE

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(56) References cited:
NO-C- 177 361 **US-A- 4 580 826**
US-A- 5 642 912

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Description

[0001] The present invention relates to a device of a tool for retrieving of equipment residue which is stuck or broken in a bore hole or the like, as is indicated in the introduction to the following claim 1. Within the art such arrangements are also called "fishing tools" and are designed to take up so-called fish, that is to say severed, broken off, buckled drill strings plus coiled pipes, snubbing pipes, tapers from drill crowns and wires, and log tools, plugs, shafts and slick pipes and the like in off-shore and onshore bore holes.

[0002] A tool for retrieving a drill string which is broken and stuck in a well, is disclosed in Norwegian patent No. 177.361. The tool is fixed to a string and is lowered into the borehole to retrieve the drill string. The tool comprises a stationary grip part which is arranged enclosingly about part of the drill string, after which a central movable grip part of the tool is caused to be forced downward into the drill string for fixing it against the stationary grip part. The grip part is forced/moved downwards by detonating an explosive charge (on impact from a piston) so that the grip part is forced downward and into the drill string with a sufficient force to bring the string radially outwards to abut against the stationary grip part.

[0003] Also US-patent specifications No. 4.580.826. discloses a pipe retrieval tool for retrieving a pipe which is stuck in the well. The tool includes a bell mouth for centering the pipe, and a spear is guided downwards into the pipe, and gripping devices carried by the spear, are released to engage the pipe so as to pull it to the surface. Reference is also made to US-patent 5.054.832.

[0004] The object of the present invention is to produce a novel construction of tools for retrieving of the different parts of objects which may be stuck or broken down within a bore hole or the like.

[0005] It is further an object to provide a novel design of such as a tool, i.e. the skirt of such a tool which is caused to enclose the equipment part (the fish) to be retrieved. Subsequently the equipment part is anchored to the skirt of the tool.

[0006] The device according to the invention is characterized in that the lower portion of the movable grip part is partly cut away to form a part-cylindrical shape of a tongue or chisel design, and that the internal surface is similarly curved or is plane.

[0007] Preferred embodiments are defined in the dependent patent claims 2-7.

[0008] By employment of both the skirt and the main piston including the different designs as defined according to the invention, all kinds of equipment (i.e. both pipe equipment, rods, log tools, partly flattened pipes which stick or is broken down within a bore hole or a well, easily may be wedged between the skirt of the tool and the main piston, and thereafter retrieved to the surface. The whole process may be carried out more readily than previously, such as by one run, in contrast to 2 «runs» minimum as have hitherto been usual.

[0009] Preferably the device is used in connection with a structure which fires the movable gripping part downward by detonation of an explosive charge, something which causes gripping part being fired downwards with very great force which is transferred radially outwards so that the equipment residue in a safe manner is squeezed/clamped to the external sleeve part. The hoisting of the equipment parts may thus occur with reduced risk of the parts loosen and falling down again. One is also ensured against unintentionally detonation of the explosive charge.

[0010] The tool consists of 4 main components and a number of lesser parts. The four parts are: main cylinder, skirt, inner cone together with main piston and firing pin. In addition come cutting pins, wedges, O-rings and primer ring and drive mix (explosive charge) with accessories.

[0011] The invention will now be explained further according to a preferred example, having regard to the following description of the tool and the enclosed figures.

[0012] Figure 1 shows a vertical section of the whole tool including the afore-mentioned parts: main cylinder, skirt, inner cone together with main piston and firing pin.

[0013] Figure 2 shows a vertical section of the drive mix unit.

[0014] Figure 3 shows a part-vertical section of the tool after it is activated and fixed to the object part (fish) which is to be fetched up from the well hole.

[0015] Figure 4 shows a perspective view of a preferred version of the lower portion of the skirt.

[0016] Figure 5 shows an alternative example of a tool, mainly for fixing to and retrieving of partly flattened pipes. The tool is shown in its initial position before activation for fixing of the pipe between the piston and the skirt.

[0017] Figure 6 shows the situation after activation, the pipe now being fixed between piston and the skirt.

[0018] Figure 7 shows an optional embodiment of the skirt and main piston. This solution is mainly for fixing and retrieving of more or less arbitrary designed residue of equipment, such as upwardly projecting bar shaped parts. The tool is shown in its initial position, before activation for clamping between piston and skirt.

[0019] Figure 8 shows the embodiment according to figure 7 after activation where the equipment part is fixed between piston and skirt.

[0020] By way of introduction Figure 1 shall be referred to, where the tool 10 is shown with the main parts in the form of a tool housing 12, skirt 14, (that is to say the stationary gripping portion), a main piston 16 (that is to say the axially displaceable gripping part) including a drive mix 18 which can be discharged on displacement of a firing pin 20.

[0021] The tool housing 10 has a shape like a cylindrical pipe sleeve having external threaded portions both in the upper and lower portions. The one (lower) threaded portion is fitted to the skirt 14, and the other (upper) is fitted to the drill string (not shown).

[0022] The tool housing comprises an inner through duct 22, which from above and downwards has a step-wise increasing diameter, that is to say that three duct sections 22a, 22b, 22c are formed with gradually increasing diameters, something which results in a first hook portion 24 and a second hook portion 26 situated below this.

[0023] The firing pin 20 is formed of a plate-shaped disc 20a and a centrally downwardly projecting leg 21 which in common with the disc has a T-shaped cross-section. Further the firing pin has a through duct 23, for passage through of drilling mud and the like as is mentioned above. Disc 20a of the firing pin 20 has a peripheral diameter which corresponds to the diameter for the central duct section, that is to say that there is very little clearance between the duct wall and the periphery of the disc. The firing pin has the task of detonating the drive charge.

[0024] The firing pin 20 is adapted to be introduced from below in said central duct so that the upper side edge 23c of the disc 20a abuts against said first hook portion 24. In this position the firing pin 20 is fixed by means of an upper break pin 27 which is installed through a duct formed through the wall portion of the tool sleeve 12, and which is led further into a sufficiently deep radial extending drilling in the piston disc 20a. As a security an additional break pin is arranged through an additional duct through the wall portion of the tool sleeve 12, this break pin not passing into the disc 20a per se, but in under the under side of the disc 20a. Now the firing pin is firmly fixed in place in the tool sleeve. The break pins are cut off at a predetermined pressure, whereby the piston loosens and is pressed downwards as a result of said pressure.

[0025] By this construction an ignition chamber 25 is formed which is defined by the inner walls of the tool housing, the underside of the firing pin disc, and the upper side of the main piston 16. As a result of the precise fit of the leg 21 to the duct through the main piston 16 the ignition chamber is satisfactorily sealed off, and on a detonation substantially all the force will be directed towards the upper side of main piston.

[0026] On the upper side of the disc 20a the inlet to the through duct 23 forms a seat for a body 28, such as a sphere, ball or the like, which can close the fluid through flow through the ducts 22a, 23, 22c. The effect of this will be explained in the following.

[0027] A main piston 16 is adapted to be introduced, also from below, internally in the tool sleeve 12, so that the upper edge of the main piston thrusts against the second hook portion 26 which is situated below the said first hook portion 24. The upper cylindrical portion of the piston has an outer form which is approximately equivalent to the diameter for the lower duct section of the tool sleeve 12. The piston has a larger upper cross-section than the central duct section of the tool sleeve and is therefore too large for it to be unintentionally pushed upwards in the duct section 22b so that the explosive

charge is detonated. The hook portion 26 in the tool housing thereby functions as a stopper, which prevents the grip part from being able to be accidentally pushed upwards in the tool housing for a detonation-releasing contact with the overlying firing pin 20.

[0028] The main piston 16 has a cylindrical base form with a through central duct 29 for the flow through of fluid, such as for drilling mud. The upper part of the main piston 16 has a substantially cylindrical peripheral basic form, an a downwardly tapering conical basic form. The piston is fastened to the tool housing 12 by means of one or more cutting pins (one shown at 30) in the upper position of the piston where abutments form with the hook portion 26. The outer side of the cylindrical part of the main piston comprise annular grooves in which O-rings are inserted (one is shown by reference numeral 30) for forming seals against inner walls of the tool sleeve 20.

[0029] The upper part 31 of the through central duct 29 of the main piston 16 capable of fluid flow through has a cross-section which is only a little larger than the cross-section for the central downwardly projecting firing pin leg 21, and a length which corresponds to the length of the leg 21. In a mounted and ready condition the leg of the main piston 16 projects somewhat into the duct which thereby functions as a leading or guiding duct for the firing pin during its introductory downward movement of activation of the fishing tool.

[0030] In the top surface of the main piston 16, see also Figure 2, a number of depressions or annular hollow spaces 17 are formed in which are located firing charges and propellant charges 18 which are discharged when the firing pin 20 is displaced downwards.

[0031] On the top of the piston 16 there is fastened a plate, which has for a task to keep the firing and propellant charges in place. Above this in turn there is fastened a firing ring 33, with firing pins 34 belonging thereto. The firing system is adapted so that when the firing pins 34 are pushed downwards through the firing ring they will lead to the propellant charges in the hollow space 18 being detonated.

[0032] Figure 2 shows an enlarged section of one of the countersinks which are illustrated in Figure 1, leg 21 of the firing pin 20 also being shown in the left half of the Figure, while the tool sleeve is shown in the right half of the Figure. The firing pins 34 have the task of setting off (detonating on impact) the charge which lies in the annular hollow space 18, so that the main piston 16 is guided down with great force. For guiding down the main piston 16 there can be used alternative devices, such as tension springs and the like, but an explosive charge is far to be preferred because of its simplicity.

[0033] The stationary grip member, in the form of the skirt 14 is shown in Figures 1 and 3, a half in the form of a vertical section and a half in the side view. The upper inner part 40 of the skirt 14 is threaded for screw fastening to the external lower threaded portion of the tool housing 12. The inside of the skirt 14 is tapered at 42,

with the largest diameter down (at 44) towards the fish. It comprises preferably left-hand threads having barbs so that it gives good holding, and that by screwing to the right one can unscrew it from the fish.

[0034] Lowermost the skirt is designed as a split spiral 46, more particularly designed having a lower curved tongue form 44 (the form of a chisel), where the lower part gradually narrows off to a partially pointed portion 45. The curved form of the tongue is designed about the longitudinal axis of the skirt. In this way the sleeve can be easily introduced/pressed (by screwing and/or pressing down) into the intermediate space between the outer side of the fish and the lining of the well. In this connection reference is made to figure 4 showing a perspective view of a preferred embodiment of the lower portion of the skirt. The lower portion 44 has been cut in a helical design 60. Further the end portion of the skirt is cut in a longitudinal direction 64 creating of a pointed end portion 62 of the tongue. This design will facilitate the positioning of the tool around the equipment part to be retrieved to the surface.

[0035] Just above the internal threaded portion of the sleeve 14 there is an inwardly projecting flange 48 which the bottom portion of the tool housing 12 rests against when the sleeve is screwed in.

[0036] On the side of the axially displaceable grip member itself, that is to say the piston 16, there are fixed four wedges 39 (fixed to the cone-shaped part of the piston with break pins) which have the task of locking the piston 16 to the main cylinder 12, when the piston is moved towards the lower position. In this position the wedges 39 will be displaced upwards and radial outwards so that they form a secure abutment against the inner side of the housing 12.

[0037] The piston 16 and the skirt 14 are mutually positioned so that the lower conical section of the piston 16 projects partly into the conical part of the skirt 14.

[0038] As mentioned the fetching-up tool having the afore-described construction, is adapted for screwing on lowermost on a pipe string correspondingly threaded internally (indicated by 60 in Figure 1, and by means of the pipe string can be lowered down through a well hole and downwards to the equipment member (fish) 70 which is to be rescued/fetched up to the surface.

[0039] The fish 70 can be centered in the hole by rotating the drill string, and causes the fish to be mounted in the hollow space within the skirt 14. In the upper part of the skirt holes 49 are made so as to drain and circulate the drilling mud out from the underside of the main piston. There is also a threaded portion here which matches the main cylinder (the housing), and a stop edge 48 which abuts the under edge of the main cylinder (the housing), and acts as stop edge and locking of the downward movement of the main cylinder (the housing), and locking of the main cylinder against the inside of the skirt, so that the main cylinder can be twisted and the main piston follows.

Function of the tool:

[0040] The tool is installed according to the procedure which is indicated above, and thereafter the tool is fastened on the lowermost end of the drill string and is so guided downwards into the hole so as to fetch the broken drill string. The tool is either screwed or pressed down on the top of the broken drill string, «the fish» 70, so that the fish 70 becomes pressed (squeezed) inwards into the inner cone of the skirt. This leads to the fish being fastened to the outside and hangs on the inside of the skirt.

[0041] A ball or a spherical valve member 28 (see Figure 1) is thereafter dropped downwards through the internal passage of the drill string to the valve seat, together with sludge/mud which is fed under pressure towards the bottom of the bore hole. The ball consequently deposits itself on the ball seat, which is on top of the firing pin and blocks off further downward through-flow of bore fluid. Then there is established, for example from the surface, a pressure with the drilling fluid/mud on the top side of the ball, until the cutting pins 27 break and the piston 20 goes down, pushes down the pistons which then cause the explosive charge 18 to explode.

This leads to the cutting pins 30 of the main piston 16 breaking, and the main piston 16 with the inner cone accelerates downwards, and strikes the inner part of the fish with a heavy force. The downwardly directed energy will then be converted to energy directed radial outwards, and the conical main piston 16 will thereby expand the steel of the fish 70 out against the inner part of the skirt 14, and a fixed connection between fish 70 and drill string (the tool) 60, is obtained. In this position the wedges 39 will thereby be displaced upwards so that the pins (not shown) are broken, and are pressed outwards so that they form an extra secure fastening abutment against the sleeve member 12 present outside. The implement (the tool) is now ready to pull up the fish.

[0042] Figure 3 shows the situation with the part of the main piston 14 which is guided downwards, including the fish 70 which is compressed between the skirt 14 and the conical section of the main piston 16. In this situation the tool lowermost on the string with the equipment part hanging on, can be raised upwards to the surface.

OPTIONAL EMBODIMENTS OF MAIN PISTON AND THE SKIRT.

[0043] The figures 5-6 show an optional embodiment of the main piston 16 and the skirt 14 of the apparatus described above for fixing and retrieving of for example flattened pipe parts shown at 72. According to this embodiment the lower portion of the main piston 16 forms a sharpened cone shape, i.e. it forms a comet shape including a downwardly directed sharpened edge portion 74. The skirt forms an internal gradually tapering longitudinal duct 76, having an upper and lower funnel

shape 73,75 towards a mainly straight tapered central portion 78. The upper funnel portion 3 includes barbs so that when the main piston 16 is fired downward (in similar manner to the embodiment shown on figures 1-3) with a greater force, it wedges against the skirt in a safe manner.

[0044] One assumes that the fish to be fixed to the tool and retrieved to surface, is a partly flattened pipe part, shown at 80. The tool is guided downwardly so that the stuck pipe portion 80 passes through the duct portion 76 of the skirt 14 and projects upwardly into the upper portion of the sleeve comprising barbs 73. When the main piston is guided downward, this will either clamp the pipe portion 80 against the one barbed side of the funnel, or the pointed end will enter the partly open pipe part, folding it outwards so that the pipe part is squeezed between the barbed portions 73 of the skirt 14 and the main piston 16.

[0045] In this version the tool is (figure 5-6) adapted to squeeze fix (for retrieving) the equipment portion of different designs, but not only necessarily pipe portions as specified herein. Since the main piston has a pointed end, it will easily intrude the upper portions of an equipment residues, folding this outwardly and fix the portion between itself and the inside of the sleeve.

[0046] Another embodiment of the combination of the main piston 16 and the skirt 14 is shown on the figures 7-8. This embodiment of the apparatus is especially intended for fixing of more solid upwardly projecting objects which is stuck or is broken in a well.

[0047] The skirt 14 forms, also according to this embodiment, an internal longitudinal extending duct 76 which is gradually tapered, including upper and lower funnel designs 73,75 towards a mainly straight tapered shorter central portion 78. Initially the main piston 14 has a cylindrical form, in that the lower portion of the cylindrical form is cut away for creating a lower part-cylindrical portion 16a, i.e. including a design of a tongue (or like a curved chisel), the outer surface 82 of which is curved (cylinder shaped) and the inner surface may be curved similarly, be plane or include other suitable surface shapes.

[0048] It is assumed that the fish to be fixed to the tool and retrieved to the surface, is a solid object projecting upwardly. The tool is lowered to an extent that the stuck object 90 passes through the duct portion 76 of the skirt 14 and extends upwardly into the upper portion of the sleeve. When lowering the main piston 16 including the lower part-cylindrical design (the tongue form) 16a, the tongue 16a will press and wedge itself in between the object/the equipment residue 90 and the inner wall 73,78 of the skirt 14. Due to the tapering of the skirt, the tongue 16a is displaced radially inwards, and due to the tension towards the equipment part 90, the tongue portion 16a is deformed, deflected and establish a strong wedging effect positioned between the sleeve wall and the equipment part. Further the equipment part 90 is deflected and is wedged towards the inner side of the

sleeve 14 on the opposite side.

[0049] The tool is now ready to be hoisted to the surface, the equipment part suspending safely fixed to the tool.

5 [0050] According to the invention there is thus provided a novel tool which in a simpler manner can fetch up equipment which has been left standing down in a well.

10 Claims

1. Device of a tool for retrieving of equipment residue (70,72,90) which is stuck or broken from a bore hole, a well or the like, where the tool may be guided downward from the surface fixed to a string, wire, or the like, the device of a tool comprising a mainly sleeve shaped stationary grip part (14,44) which is adapted to be arranged substantially enclosingly about a portion of the equipment residue (70,72,90), and a central axially movable grip part (16), which, such as by detonating an explosive charge (18), is adapted to be lowered downwards for fixing a part of the equipment residue into abutment against the stationary grip part (14,44), characterised in that the lower portion (16a) of the movable grip part (16) is partly cut away to form a part-cylindrical shape of a tongue or chisel design, and that the internal surface is similarly curved or is plane.
2. Device according to claim 1, characterised in that said lower tongue portion (16a) is arranged to be deformable and deflecting for establishing a wedging effect when positioned between the wall of the stationary grip part (14,44) and the equipment residue (90), as the tongue (16a) wedges itself in between the equipment residue (90) and the inner wall (73,78) of the stationary grip part (14).
3. Device according to claim 2, characterised in that said deforming and deflecting wedging effect of the lower tongue portion (16a) is promoted by the skirt (14) forming an internal gradually tapering longitudinal duct (76), having an upper and lower funnel shape (73,75) towards a mainly straight central portion (78).
4. Device according to claim 1, characterised in that the lower portion of the sleeve shaped stationary grip part (14,44) is helically or obliquely cut to form a downwardly directed pointed tongue end portion (62).
5. Device according to claim 4, characterised in that the inside (at 73) of the stationary grip part (14) comprises barbed portions to improve the clamping abutment of the equipment part (72).

6. Device according to any preceding claims, **characterised by** the stationary grip part (14) comprising threads having barbs to establish good holding, and that by screwing, one can unscrew the stationary grip part (14) from the equipment residue (70, 72, 90).

7. Device according to any preceding claims, **characterised in that** the outer side of the movable grip part (16) comprises wedge means (39), said wedge means (39), during the guiding down of the central movable grip part (16) of the tool, are arranged to be displaced upward and radially outwards relative to the main piston to form an abutment with a inner wall of a housing (12) of the device.

Patentansprüche

1. Vorrichtung eines Werkzeuges zum Zurückholen eines Ausrüstungsrestes (70, 72, 90), der feststeckt oder gebrochen ist, aus einem Bohrloch, einer Bohrung oder dergleichen, wobei das Werkzeug von der Oberfläche aus an einer Schnur, einem Draht oder dergleichen befestigt nach unten führbar ist, wobei die Vorrichtung eines Werkzeuges ein im wesentlichen hülsenförmiges stationäres Greifteil (14, 44), das dazu geeignet ist, im wesentlichen einschließend um einen Teil des Ausrüstungsrestes (70, 72, 90) herum angeordnet zu werden, und ein zentrales axial bewegliches Greifteil (16) hat, das zum Beispiel durch Detonation einer explosiven Ladung (18) dazu geeignet ist, zum Befestigen eines Teils des Ausrüstungsrestes nach unten in Anlage gegen das stationäre Greifteil (14, 44) gesenkt zu werden, **dadurch gekennzeichnet, dass** der untere Teil (16a) des beweglichen Greifteiles (16) teilweise weggeschnitten ist, um eine teilylindrische Form einer Zungen- oder Meisselausbildung zu bilden, und dass eine innere Oberfläche ähnlich gekrümmt oder eben ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der untere Zungenteil (16a) derart angeordnet ist, dass er zum Erwirken einer Verkeilwirkung verformbar und um- oder durchbiegend ist, wenn er zwischen einer Wand des stationären Greifteiles (14, 44) und dem Ausrüstungsrest (90) positioniert wird, indem sich die Zunge (16a) selbst zwischen dem Ausrüstungsrest (90) und der Innenwand (73, 78) des stationären Greifteiles (14) verkeilt.

3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Verformungs- und Um- oder Durchbie-

gungsverkeilwirkung des unteren Zungenteils (16a) durch einen Schurz (14) unterstützt wird, der einen inneren sich allmählich verjüngenden länglichen Kanal (76) bildet, der eine obere und eine untere Trichterform (73, 75) hat, die zu einem im Wesentlichen geraden Mittelteil (78) hin gerichtet sind.

4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der untere Teil des hülsenförmigen stationären Greifteiles (14, 44) wendelförmig oder schräg geschnitten ist, um einen nach unten gerichteten spitzen Zungenendabschnitt (62) zu bilden.

5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Innenseite (bei 73) des stationären Greifteiles (14) mit Widerhaken versehene Bereiche aufweist, um die Klemmanlage des Ausrüstungsteiles (72) zu verbessern.

6. Vorrichtung nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** das stationäre Greifteil (14) Gewinde mit Widerhaken aufweist, um ein gutes Festhalten zu erwirken, und dass das stationäre Greifteil (14) von dem Ausrüstungsrest (70, 72, 90) durch Schrauben abschraubbar ist.

7. Vorrichtung nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Außenseite des beweglichen Greifteiles (16) eine Verkeileinrichtung (39) aufweist, wobei die Verkeileinrichtung (39) während des nach unten Führens des zentralen beweglichen Greifteiles (16) des Werkzeuges dazu eingerichtet ist, relativ zu dem Hauptkolben aufwärts und radial nach außen verschoben zu werden, um eine Anlage mit einer Innenwand eines Gehäuses (12) der Vorrichtung zu bilden.

Revendications

1. Dispositif d'un outil pour récupérer un reste d'équipement (70, 72, 90) qui est coincé ou rompu depuis un trou de forage, un puits ou similaire, dans lequel l'outil peut être guidé vers le bas depuis la surface en étant fixé à un ruban, un fil, ou similaire, le dispositif pour outil comprenant une partie de saisie stationnaire (14, 44) principalement en forme de fourreau qui est adaptée à être agencée sensiblement en entourant une partie du reste d'équipement (70, 72, 90), et une partie de saisie centrale (16) axialement mobile qui est adaptée, comme au moyen de la détonation d'une charge explosive

(18), à être abaissée afin de fixer une partie du reste d'équipement en butée contre la partie de saisie stationnaire (14, 44), **caractérisé en ce que** la partie inférieure (16a) de la partie de saisie mobile (16) est partiellement découpée pour former une partie conçue sous forme de languette ou de ciseau de forme partiellement cylindrique, et **en ce que** la surface interne est incurvée de manière similaire, ou est plane.

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2. Dispositif selon la revendication 1,

caractérisé en ce que ladite partie de languette inférieure (16a) est agencée de façon à être déformable et à se défléchir pour établir un effet de coin lorsqu'elle est positionnée entre la paroi de la partie de saisie stationnaire (14, 44) et le reste d'équipement (90), lorsque la languette (16a) se coince elle-même entre le reste d'équipement (90) et la paroi inférieure (73, 78) de la partie de saisie stationnaire (14).

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3. Dispositif selon la revendication 2,

caractérisé en ce que ledit effet de déformation et de déflexion de la partie de languette inférieure (16a) est promu par la jupe (14) qui forme un conduit interne longitudinal (76) graduellement en rétrécissement, présentant une forme supérieure et inférieure en entonnoir (73, 75) vers une partie centrale principalement rectiligne (78).

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4. Dispositif selon la revendication 1,

caractérisé en ce que la partie inférieure de la partie de saisie stationnaire en forme de fourreau (14, 44) est découpée en hélice ou en oblique pour former une partie finale de languette pointue (62) dirigée vers le bas.

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5. Dispositif selon la revendication 4,

caractérisé en ce que l'intérieur (73) de la partie de saisie stationnaire (14) comprend des parties à barbes pour renforcer la butée de serrage de la partie d'équipement (72).

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6. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la partie de saisie stationnaire (14) comprend des pas de vis comportant des barbes pour établir un bon maintien, et **en ce que** par vissage, il est possible de dévisser la partie de saisie stationnaire (14) depuis le reste d'équipement (70, 72, 90).

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7. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le côté extérieur de la partie de saisie mobile (16) comprend des moyens à coins (39), lesdits moyens à coins (39) étant agencés, pendant le guidage descendant de la partie de saisie centrale mobile (16) de l'outil, de manière à être déplacés vers le haut

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et radialement vers l'extérieur par rapport au piston principal pour former une butée avec une paroi intérieure d'un boîtier (12) du dispositif.

FIG.1

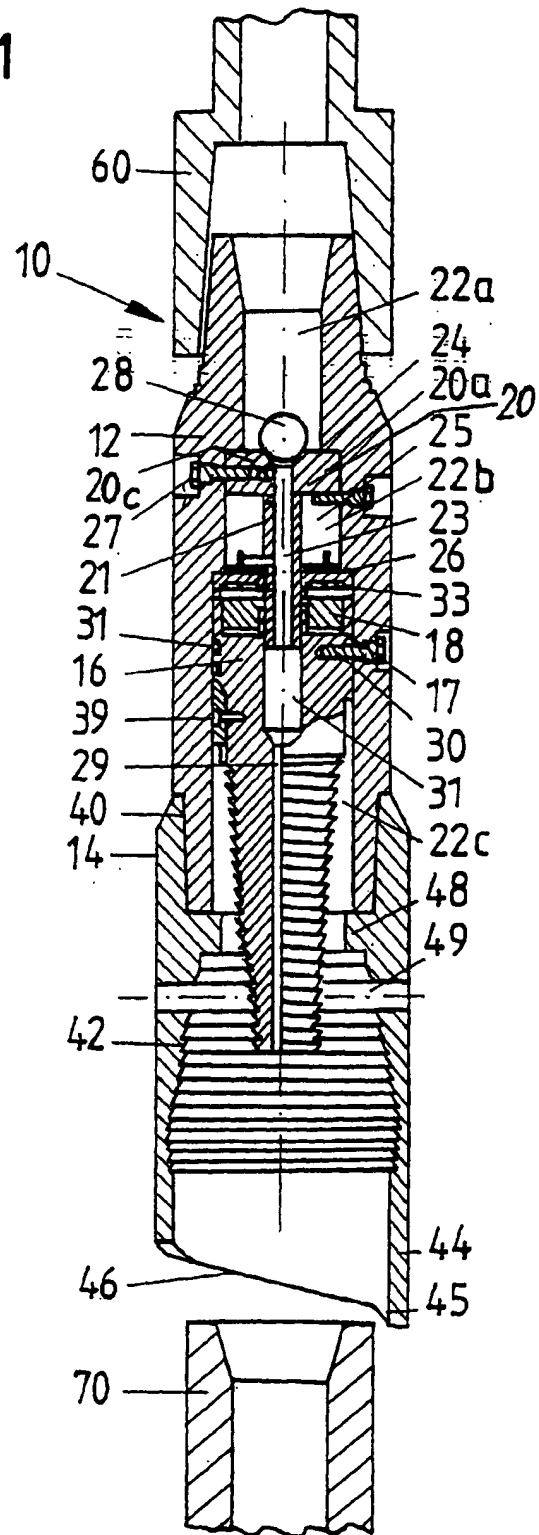


FIG. 2

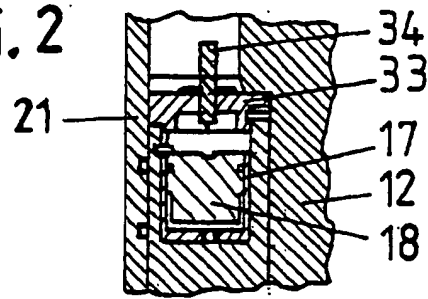


FIG. 3

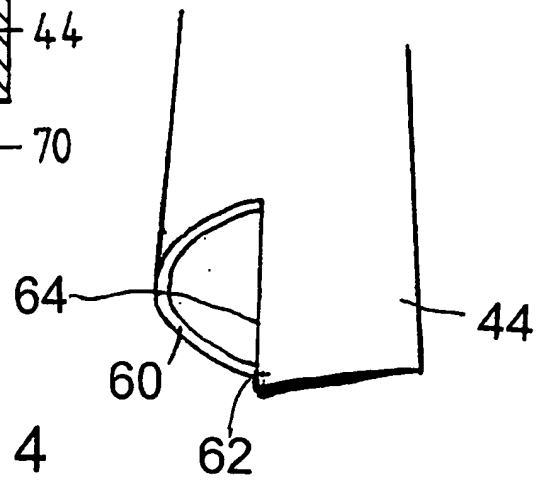
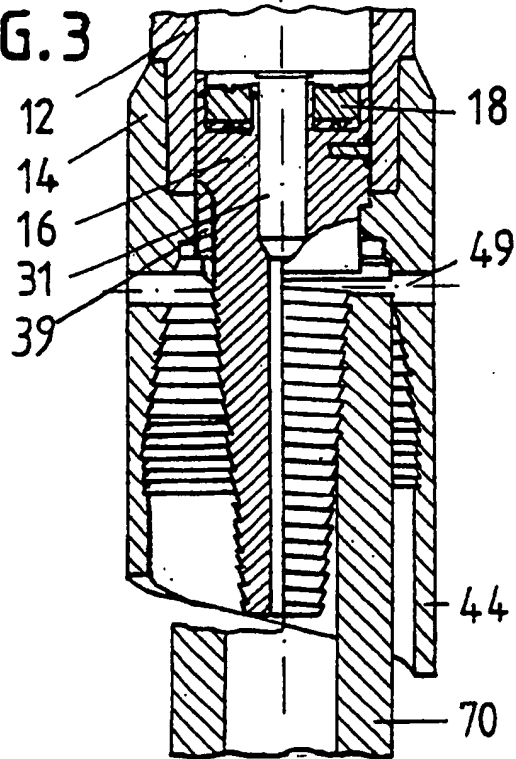


FIG. 4

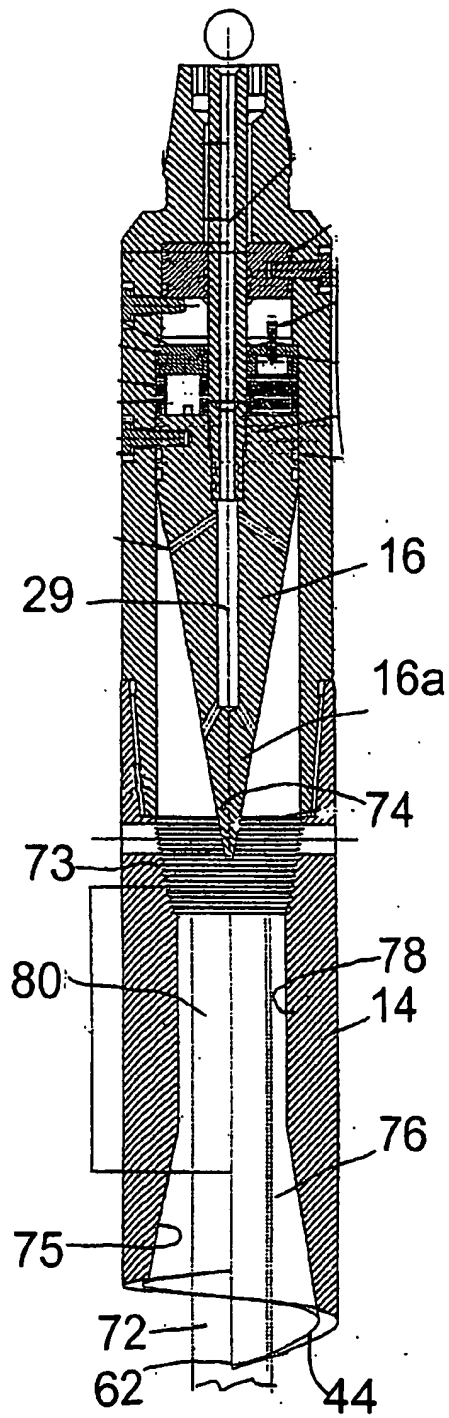


FIG. 5

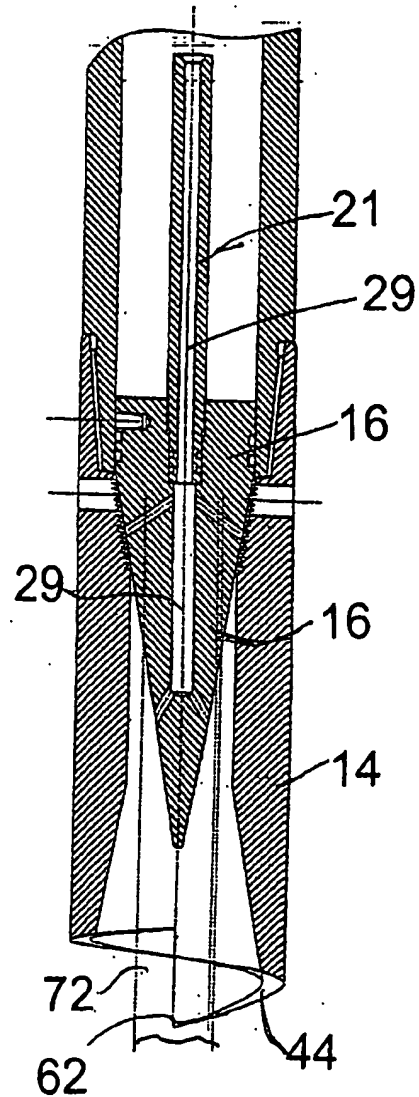


FIG. 6

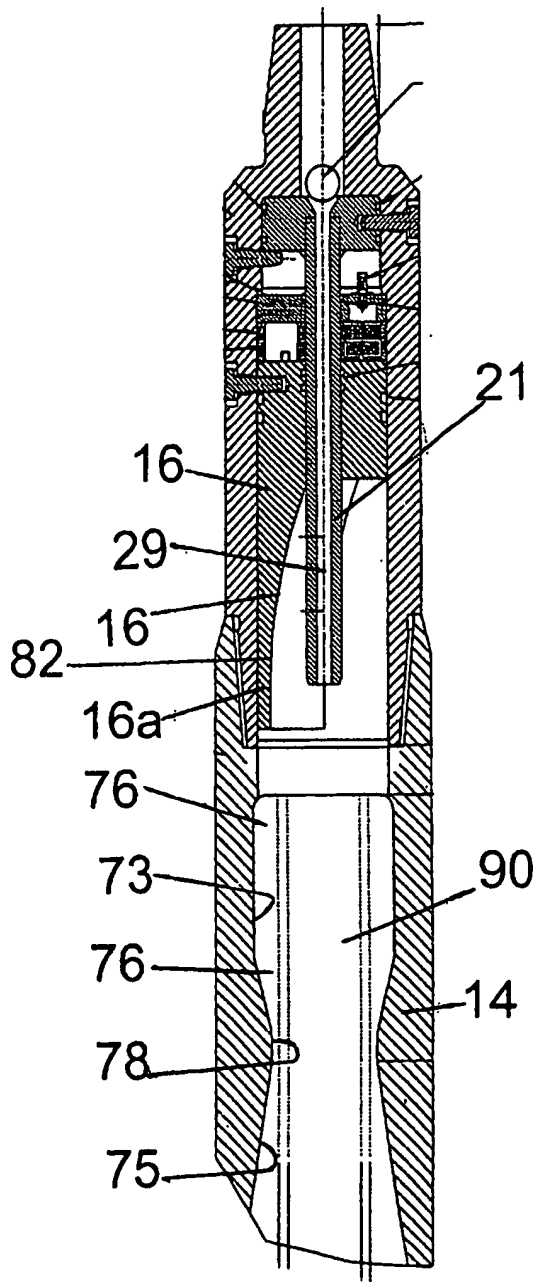


FIG. 7

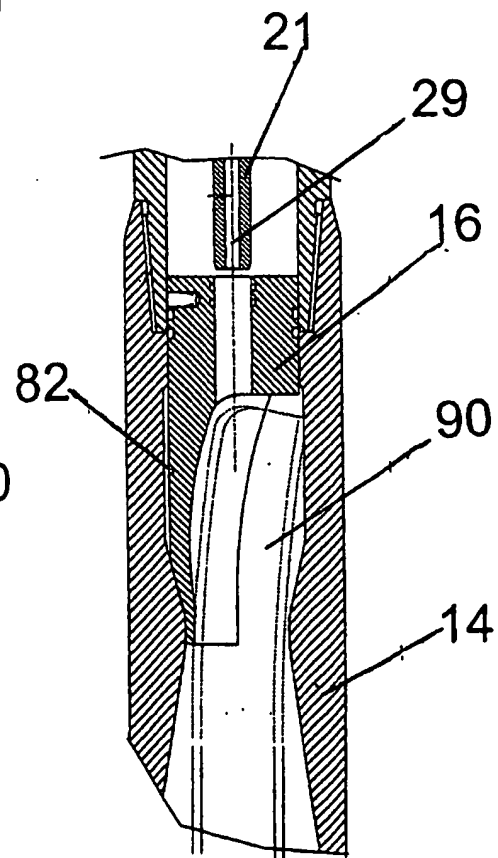


FIG. 8